

Claims

1. A playback apparatus that simultaneously performs playback of a title that includes a digital stream, and execution of an application, comprising:

a module operable to execute one or more of a plurality of applications;

a playback control engine unit operable to play a digital stream belonging to one of a plurality of titles; and

a module manager operable to control branching between the plurality of titles,

wherein each title includes a table that shows at least one application that has a life cycle bound to the title,

the module includes a virtual machine unit, a cache, and an application manager for loading an application to the cache, and

when a branch occurs between titles, the application manager reads to the cache at least one application whose life cycle is bound to a branch destination title.

2. The playback apparatus of Claim 1, wherein

each application is assigned a read priority level,

each read priority level has one of a value that shows mandatory and a value showing optional,

each application is assigned an identifier that is different to identifiers of other applications, and

the application manager reads to the cache one or more applications whose read priority level is set to mandatory, and, depending on a subsequent free capacity of the cache, reads to the

cache one or more of applications whose read priority level is set to optional.

3. The playback apparatus of Claim 1, wherein

5 the plurality of applications are assigned mutually different read priority levels and identical identifiers, and

the application manager reads, from among the applications having the identical identifiers, one of the applications exclusively to the cache, based on a scale of the cache and the read priority
10 levels of the applications.

4. The playback apparatus of Claim 3, wherein

the application manager reads the one, from among the applications having the identical identifiers, that has a highest
15 read priority level, to the cache, and then

until a judgment result of "negative" is obtained, repeats processing for:

(1) judging whether or not one, from among the applications having the identical identifiers, that has a next highest read priority
20 level can be read to the cache, and

(2) when a result of the judgment is affirmative, reading the application having the next highest priority level to the cache by overwriting the application in the cache.

25 5. The playback apparatus of Claim 1, wherein

the plurality of applications are assigned identical identifiers and mutually different read attributes, and

when a scale of the cache is greater than a predetermined capacity,

the application manager loads to the cache an application whose read attribute is set to a preload attribute, without loading to the cache an application whose read attribute is set to a load attribute, and when the scale of the cache is less than the predetermined capacity, the application manager loads to the cache the application whose read attribute is set to the load attribute, instead of preloading to the cache the application whose read attribute is set to the preload attribute.

10 6. The playback apparatus of Claim 5, wherein the application having the load attribute is recorded in an interleaved format between segments that constitute the digital stream, and

when reading the digital stream, the application manager reads the application having the load attribute to the cache.

7. The playback apparatus of Claim 5, wherein the application having the load attribute is multiplexed in a carousel format with the digital stream, and

20 when reading the digital stream, the application manager reads the application having the load attribute to the cache.

8. The playback apparatus of Claim 1, wherein when having been instructed by another application to make an application call, the application manager judges whether or not an application that is a call destination has a load attribute, and if the application that is the call destination has a load attribute, the application manager causes the virtual machine unit

to perform cache sense, and, if the application that is the call destination is in the cache, cause the application to read the application that is the call destination.

5 9. The playback apparatus of Claim 8, wherein

the application having the load attribute is one of (1) in an interleaved format between segments that constitute the digital stream, and (2) multiplexed in a carousel format with the digital stream, and

10 if the application that is the call destination is multiplexed in carousel format with the digital stream, the virtual machine continues to perform the cache sense until a predetermined time-out time elapses from when the application call was instructed by the other application.

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10. The playback apparatus of Claim 1, wherein

when an application that is a call destination is judged to not have a load attribute, the application manager performs processing to suspend digital stream playback, and read the call destination application from a recording medium to the cache, and instructs the virtual machine unit to read the call destination application from the recording medium directly to the virtual machine unit.

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11. The playback apparatus of Claim 10, wherein

25 each table shows an attribute of each application shown in the table,

when having received a call instruction from another application, the application manager refers to the table to judge

whether or not the call destination application lives at a current playback position,

when the call destination application is judged not to live, the application manager instructs the virtual machine unit to read the call destination application directly from the recording medium, after suspending digital stream playback, and

the reading of the call destination application from the recording medium to the cache is performed when the call destination application has been judged to live.

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12. The playback apparatus of Claim 1, wherein

when the branch occurs between titles, the application manager deletes from the cache an application that lives in a branch origin title but does not live in the branch destination title.

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13. A program that causes a computer to simultaneously perform playback of a title that includes a digital stream, and execution of an application, wherein

each of a plurality of titles includes a table that shows at least one application that has a life cycle bound to the title, and

the program controls the computer such that, when a branch occurs between titles, at least one application whose life cycle is bound to a branch destination title is read to a cache in the computer.

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14. A playback method that causes a computer to simultaneously perform playback of a title that includes a digital stream, and execution of an application, wherein

each of a plurality of titles includes a table that shows at least one application that has a life cycle bound to the title, and

the playback method controls the computer such that, when a branch occurs between titles, at least one application whose life
5 cycle is bound to a branch destination title is read to a cache in the computer.